

NEUTRON SCATTERING CROSS SECTION MEASUREMENTS FOR Tm-169 VIA THE (N, N') TECHNIQUE*

Afrim Alimeti, Gunter H. Kegel, James J. Egan, David J. DeSimone, Chuncheng Ji,
Don S. Kim, Thomas M. McKittrick, Carlos Roldan, Xudong Chen, Steve E. Tremblay

*University of Massachusetts Lowell, Radiation Laboratory, Department of Physics and
Applied Physics*

The neutron physics group at the University of Massachusetts Lowell (UML) has been involved in a program of scattering cross section measurements for highly deformed nuclei such as Tb-159, Tm-169, Th-232, U-235, U-238, and Pu-239. Ko et al.[1] have reported neutron inelastic scattering data from Tm-169 for states above 100 keV via the (n,n' γ) reaction at incident energies in the 0.2 MeV to 1.0 MeV range. In the present paper we report direct (n,n') measurements of neutrons scattered from Tm-169 in the 0.2 to 1.0 MeV range. The time-of-flight method was employed. It requires that our 5.5 MeV Van de Graaff accelerator be operated in the pulsed and bunched beam mode producing subnanosecond pulses at a 5-MHz repetition frequency. Neutrons are produced by the Li-7(p,n)Be-7 reaction using a thin metallic elemental lithium target. For cross-section determination, the (n,n') method is more reliable since the scattered neutrons are directly measured. However in cases where the level density of the nuclei is high, the accurate determination of the cross section of each level by (n,n') becomes very difficult due to the conflict between neutron energy resolution and neutron yield. The current measurements obtained via the (n,n') technique are complementary to the (n,n' γ) measurements.

[1] Y. J. Ko et al., Nuclear Physics A679, 147-162 (2000).

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